

**WRITTEN TESTIMONY OF  
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**BEFORE THE  
COMMITTEE ON NATURAL RESOURCES  
SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS, AND WILDLIFE  
U.S. HOUSE OF REPRESENTATIVES**

**OCTOBER 15, 2009**

**Introduction**

Good morning Chairwoman Bordallo and Members of the Subcommittee. My name is Louisa Koch and I am the director of Education for the National Oceanic and Atmospheric Administration (NOAA). Thank you for inviting me to testify before you on H.R. 3644, the *Bay-Watershed Education and Training (B-WET) Regional Program and National Environmental Literacy Grant Program Act*.

We find ourselves at a crossroads where we must address many of our Nation's most critical scientific and environmental challenges. Global climate change, rising sea levels, changing weather patterns, diminishing fisheries, and habitat losses are real threats to the American economy and way of life. At the same time, America's youth continue to fall further behind their global peers in science, technology, engineering, and mathematics (STEM). As a result, fewer Americans are prepared for careers that will address these challenges. NOAA is dedicated to countering this trend by providing research and educational resources that promote environmental literacy and foster an appreciation of the important environmental threats we face.

As the Nation's leading ocean and atmospheric science and service agency, NOAA has advanced scientific knowledge of Earth's natural systems throughout its history. For decades, education has been a core part of the NOAA portfolio, guided by the vision of leadership, findings of researchers, requests of its constituency, and the mandates of legislation (e.g., *National Sea Grant College and Program Act; National Marine Sanctuary Act; Coastal Zone Management Act; Coral Reef Conservation Act; America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (America COMPETES Act)*). These laws provide an agency-wide mandate to advance, focus, and coordinate NOAA's educational efforts, and engage a broader community of partners in creating an environmentally literate society and in ensuring a viable workforce of scientists, managers, and administrators in support of a sustainable economic future.

This mandate to advance environmental literacy has been reinforced by the recently released Interim Report of the Interagency Ocean Policy Task Force. Principle 6 states "United States policies, programs, and activities should enhance formal and informal education about the ocean, our coasts, and the Great Lakes and their uses to build a foundation for greater understanding and

improved stewardship, and build capacity to produce future scientists, managers, and members of a dynamic and innovative workforce.”

To successfully meet this demand and have sustained strategic impact, NOAA must rely not only on its internal education programs and capabilities, but must also leverage the capabilities and resources of external partners. The coordinated use of internal and external resources and expertise is essential to achieve broad environmental literacy, foster a stewardship ethic, and contribute toward a competitive and advanced workforce. Some of the most successful tools NOAA has at its disposal for harnessing external capability are competitive awards. For example, the Environmental Literacy Grant Program provides national awards aimed at broad strategic impacts. Regionally-focused competitions such as the Bay-Watershed Education and Training (B-WET) Program promote locally relevant environmental literacy. Environmental Literacy Grants focus on the development or revision of programs, materials, and exhibitions that expand the use of Earth system science in our Nation's schools, museums, aquariums, and other outreach and education efforts. These large scale awards focus on advancing the agency's mission.

### **NOAA’S NATIONAL ENVIRONMENTAL LITERACY GRANT PROGRAM**

Since 2005, NOAA’s Office of Education has promoted the improvement of public environmental literacy through our competitive education grants, also known as Environmental Literacy Grants. The recipients of Environmental Literacy Grants have consistently demonstrated: (1) alignment with at least one of NOAA’s mission goals and NOAA’s Education Strategic Plan;<sup>1</sup> (2) a robust project evaluation plan; (3) partnership with NOAA offices and programs to leverage NOAA scientific, educational and human resources; and (4) the promotion of ocean and/or climate literacy – the components of environmental literacy closely tied to NOAA’s mission. Additionally, we strive to fund projects that complement other grant programs and educational efforts offered by other offices within NOAA, and by other Federal agencies, such as the U.S. Environmental Protection Agency, National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF).

Successful projects catalyze change in K-12 and informal education through development of new partnerships, approaches, programs, and materials that not only increase knowledge of scientific phenomena, but also provide opportunities for the application of that knowledge to societal issues. Since 2005, 59 competitive awards totaling \$25.8 million have been granted supporting a wide range of project types ranging from teacher training, to experiential learning for youth and families, to the development of media products, and public opinion research.

The Environmental Literacy Grant Program has allowed us to fund many strategic, innovative and impactful projects. Demand for these grants is high. Since 2005, NOAA has funded only 9 percent of the applications received and 7 percent of the requested funds. A few of our funded projects summarized below illustrate the beneficial educational programs the Environmental Literacy Grants support.

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<sup>1</sup> The NOAA Education Strategic Plan 2009 – 2029 is available at [http://www.education.noaa.gov/plan/09\\_NOAA\\_Educ\\_Strategic\\_Plan\\_Color.pdf](http://www.education.noaa.gov/plan/09_NOAA_Educ_Strategic_Plan_Color.pdf)

## The Ocean Project’s “Building Environmental Literacy: How the Ocean Community Can Connect More Effectively with the American Public”

With support from an Environmental Literacy Grant, The Ocean Project – a network of aquariums and conservation organizations that advance ocean education – completed the single largest, most comprehensive public opinion research project ever undertaken on behalf of any environmental concern. The findings will help those addressing ocean conservation and climate change connect more strategically with the public for conservation education and action. The national survey was completed in November 2008 and generated responses by 22,000 American adults to nearly 250 survey questions. Additional tracking surveys to be conducted in 2009 and 2010 will measure changes in public opinion and testing messages on various issues. This innovative research redefines “best practices” in the field of public opinion research, using new technologies and enabling the ability to identify and track changes in the public’s attitudes and actions over time.

During the course of this initiative, The Ocean Project leveraged the initial investment from a NOAA Environmental Literacy Grant to obtain additional resources from 3 major aquariums and services provided *pro bono* from the firm conducting the research. These contributions were worth eight times the initial investment.

This market research is improving the way in which the Nation’s aquariums, zoos, museums and other educational centers inform and engage their visitors and the public. It is helping our country’s leading informal education centers more efficiently and effectively communicate the need for more sustainable and healthier communities and a better planet for all of us. The potential for these organizations to help advance conservation is huge, as exemplified by the fact that in the United States visitors to aquariums and zoos outnumber those who attend all major sporting events combined. Aquariums and zoos are using the survey results to become bolder leaders for conservation action locally and regionally. For instance, one key finding of this study indicates that 12 to 17-year-olds are not only more knowledgeable about environmental issues, but they are more willing to act than adults and have significant influence on the opinions of adults in their lives.<sup>2</sup> As a result of this information, several aquariums have already begun to change the focus of some of their educational programming to better target that audience. NOAA will work closely with aquariums in order to promote ocean literacy and issues critical to ocean health and sustainability. Educating the public on these issues helps to achieve a critical component of NOAA’s mission.

## Integration of Ocean Literacy and Climate Literacy Principles and Concepts into Formal K-12 and Informal Education

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<sup>2</sup> The Ocean Project (2009). “America, the Ocean and Climate Change: New Research Insights for Conservation Awareness, and Action, Key Findings”, [http://www.theoceanproject.org/resources/doc/America\\_the\\_Ocean\\_and\\_Climate\\_Change\\_KeyFindings\\_1Jun09final.pdf](http://www.theoceanproject.org/resources/doc/America_the_Ocean_and_Climate_Change_KeyFindings_1Jun09final.pdf)

NOAA promotes ocean and climate literacy through our competitive grants to improve public environmental literacy. The Essential Principles and Fundamental Concepts of Ocean Literacy<sup>3</sup> and Climate Literacy<sup>4</sup> were developed through collaborative processes involving scientists, educators, and decision-makers. These principles articulate what every citizen should understand about the ocean and climate and how to apply that knowledge in making decisions. All of the Environmental Literacy Grants awarded since 2006 have funded projects that align their programs, exhibits and/or instructional materials to at least one of the principles and concepts outlined in these two documents. Examples of projects that illustrate the potential impact of the infusion of these principles and concepts on public audiences include:

- The Sant Ocean Hall at the Smithsonian’s National Museum of Natural History uses the seven essential principles of Ocean Literacy as themes around which the messages of the exhibits are organized. The estimated 4.6 million visitors to the Sant Ocean Hall see and hear common messages about our Ocean Planet through this exhibit.
- The American Association for the Advancement of Science will develop, test, and promote the use of an online, searchable collection of interrelated instructional materials for teaching ideas as articulated in the Essential Principles of Climate Science.
- The Lawrence Hall of Science at the University of California-Berkeley is finishing work on an Ocean Sciences Curriculum Sequence for grades 3 to 5. This curriculum sequence, which will be distributed nationally, used the ocean literacy framework as the starting point for determining the content covered in the curriculum sequence and was developed through a rigorous research and development process.

### Science On a Sphere®

NOAA’s Science On a Sphere® (SOS) is a spherical display system designed to show images and data of Earth’s dynamic processes. Through Environmental Literacy Grants, NOAA has provided funding to educational venues, such as aquariums, museums, and science centers, to create exhibits and programming that utilize this visually stunning display system to inform the public and engage the next generation of Earth system science professionals. SOS provides these institutions an ideal tool to present dynamic and current Earth system science content through their exhibits and programming. Currently, 32 U.S. institutions, serving over eleven million visitors every year, have exhibits featuring SOS.

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<sup>3</sup> COSEE, National Geographic Society, NOAA, College of Exploration (2005). Ocean Literacy: The Essential Principles of Ocean Sciences Grades K–12, a jointly published brochure, URL: [www.coexploration.org/oceanliteracy/documents/OceanLitConcepts\\_10.11.05.pdf](http://www.coexploration.org/oceanliteracy/documents/OceanLitConcepts_10.11.05.pdf).

<sup>4</sup> The U.S. Global Change Research Program, (2009). Climate Literacy: The Essential Principles of Climate Science – A Guide for Individuals and Communities, a brochure, URL: <http://www.climate.noaa.gov/education/pdfs/ClimateLiteracyPoster-8.5x11-March09FinalLR.pdf>

NOAA also supports the SOS Users Collaborative Network ([www.oesd.noaa.gov/network](http://www.oesd.noaa.gov/network)) as a mechanism for public and private institutions to work together to maximize the effectiveness of this exciting new technology as an education platform and to aid in informing grant program investments. The content and programming used for SOS translates to other data visualization and exhibit technologies, and over half of the network members have reported forming new partnerships as a result of their involvement with SOS. A visitor study of the new multi-faceted Sant Ocean Hall at the Smithsonian National Museum of Natural History found that SOS was the top exhibit where visitors reported learning two out of the six main messages of the hall. Evaluation reports on visitor experience and understanding indicated that visitors to SOS stayed far longer than is average for similar exhibits, they were captivated and intrigued by what they saw, and gained a new appreciation for Earth as an interconnected and dynamic system. Each SOS project has an integral evaluation component that aids in advancing the shared knowledge of how these technologies can be effectively implemented for informal science education.

### EarthLabs – A National Model Earth Science Lab Course

Currently, K-12 Earth science classes do not commonly require a rigorous lab component due to weak state standards and assessments in the Earth system sciences.<sup>5</sup> As a result, these courses are commonly used as remedial high school classes and in some states are not recognized as certified laboratory sciences that qualify students for college admission. Therefore, high school students already interested in science rarely take Earth science courses because it will not help them when entering college. To respond to this, the Environmental Literacy Grant Program funded a project called EarthLabs, a series of Earth science online labs developed by TERC, a not-for-profit education research and development organization. The four labs developed with NOAA funding — Corals, Drought, Fisheries, and Hurricanes — were designed to create a new model of Earth and environmental science courses recognized as true lab sciences. EarthLabs will improve Earth system science in K-12 curricula by providing a quantitatively based, rigorous laboratory course that complies with state and national guidelines for science content and for certification as a laboratory science course. These inquiry-based experiences engage students in deep and long-lasting investigations that enable them to explore the interconnected Earth systems. To promote EarthLabs, TERC is developing state alliances that will promote the use of the new model, and is working to have the courses recognized as lab sciences. NOAA's initial investment in the first four EarthLabs has been leveraged by NSF and NASA which are supporting the development of additional labs to build out to a semester-long course.

### **THE BAY-WATERSHED EDUCATION AND TRAINING PROGRAM**

The B-WET Program promotes locally relevant, systemic experiential learning in our Nation's schools. The goal of the program is to use "meaningful watershed educational experiences" that are grounded in hands-on outdoor exploration, and to increase understanding and stewardship of our marine and coastal resources. Locally relevant experiential learning opportunities enrich the

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<sup>5</sup> Hoffman, Martos and Barstow Daniel. April 2007. Revolutionizing Earth System Science Education for the 21st Century, Report and Recommendations from a 50-State Analysis of Earth Science Education Standards. TERC, Cambridge MA, 59pp. [http://www.oesd.noaa.gov/noaa\\_terc\\_study\\_lowres.pdf](http://www.oesd.noaa.gov/noaa_terc_study_lowres.pdf)

traditional formal learning environment while simultaneously meeting state learning objectives. Connecting children with nature through outdoor experiential activities of the type B-WET supports may also instill in them the enthusiasm to pursue a career in science or in another STEM field.<sup>6</sup>

The B-WET program began in the Chesapeake Bay in 2002 to support the commitment of the Chesapeake Bay Program, a partnership for watershed restoration. The Chesapeake Bay Program commitment called for every student in the watershed to have a meaningful watershed educational experience before graduation from high school.<sup>7</sup> In the context of the legislation, B-WET represents one way that NOAA can support such regional initiatives. B-WET now exists in six regions across the country: Chesapeake Bay, California, Hawaii, New England, the Gulf of Mexico, and the Pacific Northwest.

The B-WET program provides competitive grants to support existing environmental education programs, foster the growth of new programs, and develop key partnerships among environmental education programs within targeted watersheds. Each region is administered by a NOAA educator program manager in a regional office and is tailored to regional priorities in order to ensure relevance and alignment with state and regional environmental and educational objectives. NOAA is also working in partnership with state departments of education, natural resource agencies, and environmental education providers and associations to increase science and experiential education. Though specific regional focus and priorities may differ, B-WET regions serve common goals and employ similar methods to promote meaningful watershed educational experiences. Coordination at the national level helps build best practices across the regional programs and ensure progress toward common goals.

### Accomplishments

Congress has directed through NOAA over \$40 million to support more than 530 projects in six regions of the country. In FY 2008, B-WET reached over 125,000 students and 6,000 teachers, through 130 projects.

Results of a multi-year, programmatic evaluation of B-WET Chesapeake<sup>8</sup> showed a statistically significant increase in students' attitudes and behavior associated with environmental stewardship, and demonstrated program effectiveness at increasing teachers' confidence in their ability to implement meaningful watershed educational experiences (MWEEs). This evaluation also showed an increase in the number of teachers implementing MWEEs in their classes, and

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<sup>6</sup> Geczi, Emilian and Cerk, Keith. Outdoor Education: An Entry to Careers in Science and Math For Diverse Populations. <http://www.education.com/reference/article/outdoor-education-science-math-diverse/>

<sup>7</sup> Chesapeake Bay Program. <http://www.chesapeakebay.net/index.aspx?menuitem=13853>

<sup>8</sup> Kraemer, Anita; Zint, Michaela; and Kirwan, Jeffrey. February 2007. An Evaluation of National Oceanic and Atmospheric Administration Chesapeake Bay Watershed Education and Training Program Meaningful Watershed Educational Experiences. Annapolis MD, 105pp. <http://chesapeakebay.noaa.gov/docs/BWETEvalssummary.pdf>

that participation in such activities has the potential to improve student achievement in science. These types of results are critical to NOAA's effort to support an educated, informed public that values the importance of scientific knowledge in society.

An evaluation of the California B-WET program during 2006-2007<sup>9</sup> showed that California B-WET programs produced statistically significant increases in students' knowledge about local watersheds and marine sanctuaries and in students' enjoyment in learning about protecting the ocean. Based on reports that provided paired pre/post-test changes, California B-WET projects showed increases in students' and teachers' ability to identify the ways watersheds and the ocean become polluted and ways to prevent pollution.

### Program Benefits

The B-WET program encourages collaboration. B-WET grantees partner with NOAA entities, other Federal and state agencies, school divisions, aquariums, marine labs, and education networks. These partnerships leverage funding, and provide resources, expertise, access to field sites, and data to develop robust programming. The collaborative nature of B-WET projects is especially valuable in elevating the importance of environmental stewardship for our Nation.

In the Chesapeake Bay watershed, the addition of B-WET to an ongoing education effort solidified and enhanced NOAA's ability to contribute to state and regional education efforts. In April 2008, the State of Maryland established through Executive Order the Partnership for Children in Nature. The report and recommendations resulting from this order resulted in the first state literacy plan that has as its foundation both formal classroom environmental education and unstructured opportunities for communities and families to interact with nature. Based on a successful long-term relationship between NOAA and the State of Maryland, the report specifically identifies B-WET as a key program supporting the effort to provide systemic outdoor education to every student, every year of their academic career. Similar efforts are underway in other states.

At the level of the individual teachers and students reached, B-WET projects have multiple benefits. For example, California B-WET has partnered for the past four years with the Recruitment in Science (RISE) program, an organization dedicated to enhancing diversity in the sciences by providing underrepresented students the tools and inspiration to attend college. Many students who participate in this program have not been introduced to science careers through their school activities, and do not have firsthand knowledge of the options that exist for them.

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<sup>9</sup> Parsons, Chris. 2008. NOAA California B-WET Program Project Evaluation Report Review 2007-2008. Word Craft, Monterey Bay CA, 17pp. [http://sanctuaries.noaa.gov/news/bwet/docs/ca\\_bwet07.pdf](http://sanctuaries.noaa.gov/news/bwet/docs/ca_bwet07.pdf)

## **NOAA COMMENTS ON THE HOUSE BILL**

H.R. 3644 supports NOAA's goals for improving environmental literacy. As nationally competitive awards, Environmental Literacy Grants and B-WET programs would allow NOAA to engage partners in formal and informal education to achieve the goals set out in NOAA's Education Strategic Plan 2009-2029.<sup>10</sup>

The Administration supports the Environmental Literacy Grant Program to address all of NOAA's mission goals. As such, we suggest amending the language referencing coastal, ocean and watershed education to reference coastal, ocean, Great Lakes, climate and weather education.

The Administration would prefer to have flexibility in configuring the administrative structure of B-WET, as opposed to the 11 regional offices that are authorized in H.R.3644. Many programs within NOAA are developing or have implemented a regional administrative structure. It would be helpful for the B-WET program to have the ability to leverage and be streamlined with NOAA's other regional programs.

The B-WET program has been well-received and is a significant component of NOAA's environmental education efforts in several regions around the country. Considering that B-WET has a local focus, we encourage the Committee to strengthen the non-Federal matching requirement. We also note that NOAA supports education and outreach programs in the Office of Education and throughout NOAA's line offices – the authorization levels in H.R. 3644 could divert funding from these other programs.

## **CONCLUSION**

NOAA can best achieve its mission, to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs with the help of an environmentally literate public. By authorizing the Environmental Literacy Grant Program, H.R. 3644 will assist NOAA in reaching a wide range of audiences through a variety of educational programs and projects that support its mission goals.

By authorizing the B-WET program, this bill would help NOAA educate individuals and communities about how their actions influence the watersheds in which they live and coasts around them, and how the ecological status of those watersheds and coasts in turn influence their everyday lives. NOAA recognizes that knowledge and commitment built from firsthand experience, especially in the context of one's community and culture, is essential for achieving environmental stewardship.

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<sup>10</sup> The NOAA Education Strategic Plan 2009 – 2029 is available at [http://www.education.noaa.gov/plan/09\\_NOAA\\_Educ\\_Strategic\\_Plan\\_Color.pdf](http://www.education.noaa.gov/plan/09_NOAA_Educ_Strategic_Plan_Color.pdf)



In summary, NOAA supports the intent of H.R. 3644 to authorize two successful programs, NOAA's Environmental Literacy Grant Program and the Bay-Watershed Education and Training Program. Combined, these programs allow NOAA to provide support for environmental and Earth systems science education, and address its education and scientific mandates. We thank the Subcommittee for its interest in promoting environmental literacy and look forward to working with you as this legislation moves forward.